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EXAMINER

PARSONS, THOMAS H

ART UNIT PAPER NUMBER

1745

DATE MAILED: 09/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,318

Applicant(s)

BASOL, BULENT M

Examiner

Thomas H Parsons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 22-40 is/are rejected.
- 7) ☒ Claim(s) 4-21 and 41-44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 August 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Page 2, line 20, after "Serial No. 09/466,014", suggest inserting "--now U.S. Patent No.

6,352,623)--;

Page 10, line 15, after "09/466,014", suggest inserting "--now U.S. Patent No. 6,352,623)-

;

Page 16, line 22, suggest changing "his" to --this--; and,

Page 19, line 20, suggest changing "positive" to --negative--.

Appropriate correction is required.

Claim Objections

2. Claim 38 objected to because of the following informalities:

Line 7, "obtained from to the source" appears awkwardly worded.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claim 30 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 30 recites the limitation "the electrochemical mechanical processing system" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

Further, it is unclear as to what is the structural relationship between the apparatus of claim 22 and the electrochemical mechanical processing system of claim 30, or how claim 30 is further limiting of claim 22.

Claims 31-37 are rejected as being dependent upon rejected claim 30.

Claim Rejections - 35 USC § 103

5. Claims 1-3 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh (6,056,869).

Claim 1: Uzoh in Figures 1-3 discloses a method of removing a conductive material from a bevel edge of a conductive layer of a workpiece, including a front edge surface of the conductive layer, using an etching solution and an etching electrode in contact with the etching solution (col. 9: 4-14) comprising the steps of: rotating (via vacuum chuck 27 and rotation means 26) the workpiece (wafer 3); directing a continuous stream of the etching solution (as indicated by arrow 49) to the bevel edge of the workpiece, while rotating the workpiece; and applying a potential difference between the electrode and the conductive layer of the workpiece while step of directing occurs (col. 5: 9-11; and col. 2: 26-29)(abs.; col. 2: 8-29; col. 4: 29-col. 9: 14).

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As to the recitation "including the front edge surface of the conductive layer" Uzoh on col. 8: 16-19 discloses that the number and arrangement of nozzles and flow therefrom may be designed so as to be sufficient to treat all surface of the wafer or substrate that it is desired to treat and with the desired effectiveness; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Uzoh apparatus to provide for directing a continuous stream to the front edge surface of the conductive layer.

Claim 2: The method according to claim 1 wherein the step of directing directs a mild etching solution (sulfuric acid which is the same as that instantly disclosed) to the bevel edge.

Claim 3: Uzoh discloses the same etching solution (sulfuric acid) as is instantly disclosed, and the application of a potential difference in the same manner as instantly disclosed. Therefore, the method of Uzoh would have inherently etched the bevel edge more as a result of the applying of the potential difference than would occur without the application of the potential difference.

Claim 22: Uzoh in Figures 1-3 discloses an apparatus an apparatus for performing an edge bevel removal process on a front conductive surface edge of a workpiece comprising: a chamber (75 as mention on col. 7: 8-14); a moveable and rotatable workpiece holder (vacuum chuck 27) that holds and rotates the workpiece (col. 4: 29-48); and an edge bevel removal system, the edge bevel removal system including: at least one edge conductor material removal device (21) for supplying a continuous stream of an etching solution toward at least the front conductive surface edge of the workpiece; and an electrode (21) adapted to physically contact the continuous stream and for supplying a potential difference between the continuous stream and the front conductive surface of the workpiece.

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Claim 23: Uzoh in Figures 1-3 discloses at least one nozzle disposed within a position relative to the workpiece such that a continuous stream of the etching solution is directed outwardly toward the front conductive surface edge of the workpiece (col. 8: 10-19).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 24-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh as applied to claim 22 above, and further in view of Volodarsky et al. (6,352,623).

Uzoh is as applied, argued, and disclosed above, and incorporated herein.

Claim 24: Uzoh does not disclose a cleaning nozzle disposed within the chamber.

Volodarsky et al. in Figure 2 disclose at least a cleaning nozzle (40) disposed within the chamber (col. 6: 17-25).

The recitation “for directing a mild etching solution to a front surface of the workpiece” has been construed as a statement of intended use which adds no further structure to the apparatus itself Uzoh combination apparatus.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the apparatus of Uzoh by incorporating the cleaning nozzle of Volodarsky et al. because Volodarsky et al. disclose cleaning nozzles that would have provide

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a means for sprays a mild etching solution to the surface of the wafer thereby removing unwanted materials and improving overall product quality.

Claim 25: The recitation “wherein the mild etching solution and the etching solution are the same solution” has been construed as statement s of intended us which adds no further structure to the Uzoh combination apparatus.

Claim 26: Uzoh does not disclose another chamber disposed below the chamber; a moveable guard adapted to separate the another chamber from the chamber; and a system for processing a front surface of the workpiece disposed in the another chamber.

Volodarsky et al. in Figure 2 disclose another chamber (4) disposed below the chamber; a moveable guard (30, 31) adapted to separate the another chamber from the chamber when the workpiece is in the chamber and the at least one edge copper removal device is being used; and a system (20) for processing a front surface of the workpiece disposed in the another chamber.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the apparatus of Uzoh by substituting the chamber with the chamber of Volodarsky et al. and, further incorporating the another chamber disposed below the chamber; a moveable guard adapted to separate the another chamber from the chamber; and a system for processing a front surface of the workpiece disposed in the another chamber because Volodarsky et al. disclose a chamber, another r chamber, a moveable guard, and a processing system that would have provide an apparatus capable of carrying out multiple processes in multiple section of a vertically configured containment chamber, decreased physical space occupied by multiple chambers, and efficiently deposit and clean workpiece surface thereby improving product quality, throughput and manufacturing costs.

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Claim 27: The rejection is as set forth in claim 26 wherein further Volodarsky et al. disclose an electrochemical mechanical processing system (20).

Claim 28: The rejection is as set forth above in claims 26 and 27 wherein further Volodarsky et al. disclose an electrochemical mechanical deposition system (20).

Claim 29: The rejection is as set forth above in claim 27 wherein Volodarsky et al. disclose an electrochemical mechanical processing system (20) disposed within the chamber for providing electrochemical mechanical processing on a front surface of the workpiece.

8. Claims 30-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh as applied to claim 22 above, and further in view of Basol et al. (6,610,190).

Uzoh is as applied, argued, and disclosed above, and incorporated herein.

Uzoh does not disclose an electrochemical mechanical processing system includes a cavity, an electrode, etching solution, a workpiece surface influencing device and a terminal. Note however that Uzoh discloses that his apparatus can be incorporated or integrated into equipment (col. 2: 35).

Basol et al. in Figure 7 disclose an electrochemical mechanical processing system (100) includes a cavity (enclosure 116), an electrode (anode 112) disposed within the cavity, the etching solution disposed within the cavity to provide one electrical path from the electrode to the front surface of the workpiece, a workpiece surface influencing device (shaping plate 114) disposed in proximity to workpiece and through which the etching solution flows and a terminal (one negative terminal 126) for providing electrical contact to the workpiece during

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electrochemical mechanical processing so that a potential difference between the etching solution disposed within the cavity and the workpiece can be maintained (col. 9: 27-col. 10: 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the apparatus of Uzoh by incorporating or integrating the electrochemical mechanical processing system of Basol et al. because Basol et al. teach and electrochemical mechanical processing system that would have minimized edge exclusion problems and deposited uniform and planar conductive films thereby improving overall product quality.

The recitation “wherein the etching solution used by the at least one edge conductor material removal device is also used by the electrochemical mechanical processing system” has been construed as a statement of intended use that does not further limit the overall physical structure of the apparatus.

Claim 31: The rejection is as set forth above in claim 22 wherein Uzoh in Figure 3 discloses a conduit (51) for providing the continuous stream of the etching solution from the cavity to the at least one edge conductor material removal device (col. 6: 29-37).

Claim 32: The rejection is as set forth in claim 30 wherein Basol et al. further disclose including another terminal (positive terminal 124 or another negative contact 126 terminal) that provides electrical contact to the workpiece during edge conductor material removal.

Claim 33: The rejection is as set forth above in claim 30 wherein further Basol et al. disclose that the another terminal is the same as the terminal (i.e. 126 contact members are the same).

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Claim 34: The rejection is as set forth above in claim 30 wherein further Basol et al. disclose that the another terminal (124) is different from the terminal (negative contact member 126).

Claim 35: The rejection is as set forth above in claim 1 wherein Uzoh on col. 8: 16-19 discloses that the number and arrangement of nozzles and flow therefrom may be designed so as to be sufficient to treat all surface of the wafer or substrate that it is desired to treat and with the desired effectiveness; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Uzoh apparatus to provide for directing a continuous stream to the front edge surface of the conductive layer.

Claim 36: The rejection is as set forth above in claim 30 wherein Basol et al. disclose that the electrochemical mechanical processing system is an electrochemical mechanical deposition system (100).

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 38-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Hongo et al. (6,615,854).

Claim 38: Hongo et al. in Figure 3 disclose a method of performing edge bevel removal on a workpiece and cleaning of a front face of a workpiece using a solution comprising the steps

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of: rotating the workpiece (Figure 3 shows motor M rotating wafer W via pulleys P1 and P1); directing a continuous stream of a solution (etching solution 3) obtained from a source to a bevel edge of a conductive layer of the workpiece while rotating the workpiece to remove conductive material from the bevel edge at a first rate; and directing a spray of the solution (cleaning solution a and/or b) obtained from the source to a front face of the conductive layer of the workpiece while rotating the workpiece to clean the front face of the workpiece (abs.; col. 2: 63- col. 5: 2).

Claim 39: Hongo et al disclose on col. 4: 14-17 that the steps of directing the stream and directing the spray are performed sequentially.

Claim 40: Hongo et al. on col. 4: 12-14 disclose that the steps of directing the stream and directing the spray are performed simultaneously.

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent

11. Claims 38-39 are rejected under 35 U.S.C. 102(a) as being anticipated by Mayer et al. (6,309,981).

Claim 38: Mayer et al. disclose a method of performing edge bevel removal on a workpiece and cleaning of a front face of a workpiece using a solution comprising the steps of: rotating the workpiece; directing a continuous stream of a solution obtained from a source to a bevel edge of a conductive layer of the workpiece while rotating the workpiece to remove conductive material from the bevel edge at a first rate; and directing a spray of the solution obtained from the source to a front face of the conductive layer of the workpiece while

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rotating the workpiece to clean the front face of the workpiece (col. 2: 65-col. 3: 20; and col. 5: 53-col. 10: 15).

Claim 39: Hongo et al disclose that the steps of directing the stream and directing the spray are performed sequentially (col. 5: 53-col. 10: 15).

Allowable Subject Matter

12. Claims 4-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Claims 41-44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas H Parsons whose telephone number is (703) 306-9072. The examiner can normally be reached on M-F (7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (703) 308-2383. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Thomas H Parsons
Examiner
Art Unit 1745


Patrick Ryan
Supervisory Patent Examiner
Technology Center 1700